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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/254,118	05/19/1999	KOHEI TATSUMI	52433/544	6494

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EXAMINER

CHAMBLISS, ALONZO

ART UNIT PAPER NUMBER

2827

DATE MAILED: 06/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/254,118

Applicant(s)

TATSUMI ET AL.

Examiner

Alonzo Chambliss

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 4/1/02(amendment C).
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Amendment C filed 4/1/02 has been fully considered and made of record in Paper No. 4/1/12.

Response to Arguments

2. Applicant's arguments filed 4/1/02 in Paper No. 17 have been fully considered but they are not persuasive.

Applicant alleges that the Okuyama does not disclose or suggest metal balls are thermally diffused so as to form plating or a coating. This argument is respectfully deemed to be unpersuasive the Okuyama discloses metal balls 2 are melted resulting in the metal balls 2 being welded with the substrate 7 utilizing a hot plate 12 (see English abstract and all of the figures). Okuyama does not explicitly use the words " thermally diffused " instead Okuyama uses the word " weld ". Thermally diffusion means using heat in a diffusion bonding process for joining metals by using only heat and pressure to achieve atomic bonding. Now, weld means a union made between two metals by welding, wherein welding is the joining of two metals by applying heat to melt and fuse them with or without filler metal. Therefore, Okuyama teaches thermally diffusion, since welding means the joining of two metals by applying heat to melt and fuse them without a filler metal, which is the same process that takes place in thermally diffusion.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-6 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Okuyama (JP 5-129374).

With respect to Claim 1, Okuyama teaches metal balls 2 (i.e. solder balls made of metal) at selected portions (i.e. pads) 8 that are located at selected portions of a substrate for mounting semiconductor devices thereon. One skilled in the art readily recognizes that the solder balls 2 are connected to semiconductor devices, since metal balls 2 on the insulated substrate 7 are known in the art to be incorporated in flip chip connections or when attached to an interposer placed between a substrate and a flip chip. The metal balls 2 are adhered or bonded to the selected portions. The metal balls 2 are melted resulting in the metal balls 2 being welded with the substrate 7 utilizing a hot plate 12 (see English abstract and all of the figures). Okuyama does not explicitly use the words "thermally diffused" instead Okuyama uses the word "weld". Thermally diffusion means using heat in a diffusion bonding process for joining metals by using only heat and pressure to achieve atomic bonding. Now, weld means a union made between two metals by welding, wherein welding is the joining of two metals by applying heat to melt and fuse them with or without filler metal. Therefore, Okuyama teaches thermally diffusion, since welding means the joining of two metals by applying heat to melt and fuse them without a filler metal, which is the same process that takes place in

thermally diffusion. Thereby, selectively plating the selected portions 8 of the substrate 7 for electronic devices (i.e. semiconductor device) with a different metal (i.e. electrode or contact pad) of the electronic device (see English abstract and all of the figures).

With respect to Claim 2, Okuyama teaches balls 2 held on an arrangement base plate 1 having through holes 4 provided at positions corresponding to the portions 8 to be plated with the substrate 7 for electronic devices. The base plate 1 is transferred above the substrate 7 for mounting electronic devices. The base plate 1 is transferred above the substrate 7 for mounting electronic devices. The metal balls 2 are provisionally adhered and held by the through holes 4 to the portions 8 to be plated (see all of the figures).

With respect to Claim 3, Okuyama teaches a provisionally arranging and holding procedure, wherein excess metal balls 2 are adhered to the arrangement base plate 1 and removed by applying vibrations from the suction of the arrangement base plate 1, thereby provisionally arranging and holding the metal balls 2 (see all of the figures).

With respect to Claim 4, it is inherent in an environment where a suction head 1 sucks metal balls 2 in a vacuum that an ultrasonic vibration is used, since in a vacuum the force of the air would cause the suction head to vibrate by ultrasonic vibration to force the desired ball to fit into the holes 4 of the suction head 1 and the excess metal balls removed as shown by Okuyama.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 5, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuyama (JP 5-129374) as applied to claim 1 above, and further in view of Le Coz et al. (U.S. 5,762,258).

With respect to Claim 5, Okuyama discloses a solder ball melted by reflowing to selectively plate the selected portions 8 of the substrate electronic devices with a different metal (see English abstract and all figures).

Okuyama fails to disclose the following:

- (1) metal balls made of tin/lead, and
- (2) a substrate for electronic device that is an insulating resin or a ceramic material and the selected portion are wiring composed of copper.

However, Le Coz discloses a metal ball made of a combination of tin and lead (see col. 4 lines 15-17). Therefore, it would have been obvious design choice to incorporate the tin/lead solder for the material of the balls taught in the device of Okuyama, since the tin/lead solder balls provides a good electrical connection for conductive pads on substrate as taught by Le Coz.

With respect to Claim 7 and 8, Le Coz discloses a substrate 51 for electronic device is an insulating resin or a ceramic material and the selected portion are wiring composed of copper. The balls 15 are held in holes 13 of base plate 11, which are connected to the copper wiring (see col. 1 lines 27-55).

7. Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuyama (JP 5-129374) as applied to claim 1 above, and further in view of Le Coz et al. (U.S. 5,762,258).

With respect to Claims 6 and 9, Okuyama fails to disclose balls made of gold and the substrate for the electronic devices is a lead frame composed of copper with the leads of the lead frame are partially plated. However, Dunaway discloses balls 80 made of gold and the substrate for the electronic devices is a lead frame composed of copper with the leads 76 of the lead frame are partially plated (see col. 5 lines 49-61 and col. 6 lines 5-20). Therefore, it would have been obvious to one of ordinary skill in the art incorporate balls made of gold and a lead frame with the device of Okuyama, since the balls can be attached to a lead frame and a plated lead would have added the benefit of the plating material for adhesion to the ball, and forming a good electrical connection, as shown by Dunaway.

The prior art made of record and not relied upon is cited primarily to show the process of the instant invention.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.


Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956.

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AC/June 19, 2002


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